

REMARKS

This amendment is being filed in response to the Office Action dated August 11, 2004, in which the Examiner rejected claims 1-40 on prior art grounds.

103(a) Rejection of Claims 1-40 –

Claims 1-40 were rejected under 35 USC 103(a), as being unpatentable over Benghezal et al. (US Patent No. 6,588,269). In view of the current amendments to the claims and for the reasons stated below, the Applicant respectfully requests reconsideration and allowance of claims 1-9, 11-18 and 29-39.

Claims 1-9 and 11-18-

Amended claim 1 calls for a fluid level sensor having a mounting bracket with a linkage component for maintaining the ultrasonic transceiver in a generally parallel disposition to a fluid surface; this feature is neither shown nor suggested in the Benghezal patent. Moreover, the claimed mounting bracket aids the fluid level sensor of this invention in a number of easy, not the least of which involves the improved operation of the sensor and the increased ease in installation. Accordingly, the mounting bracket of amended claim 1 is not obvious in view of Benghezal, and the claimed fluid level sensor including a mounting bracket constitutes more than a mere design choice, as suggested by the Examiner.

In no part of the Benghezal reference is there any disclosure or suggestion of utilizing a mounting bracket to maintain an ultrasonic transceiver in a particular orientation, let alone the mounting bracket called for in amended claim 1. The written description is largely silent on this issue, as it simply states:

...within the framework of the invention, the two piezoelectric cells 10, 12 placed preferably level with the bottom of a tank are adapted so as to emit ultrasound waves respectively toward the upper surface of the liquid referenced 14 in FIG. 1 and toward a reference reflector 16, situated a known distance D from the associated cell 12.¹

It is not apparent from the written description how the piezoelectric cells are “placed

¹ US Patent No. 6,588,269; column 2, lines 12-18

preferably level with a bottom of the tank", and the figures shed absolutely no light on the issue, as FIGS. 1 and 2 are simple schematic drawings. Furthermore, a review of the other cited references reveals neither a disclosure nor a suggestion for providing the mounting bracket called for in amended claim 1.

The present application, on the other hand, describes a preferred embodiment of a novel mounting bracket that makes contributions to both the installation process and the operation of the sensor.

When assembled, the fluid level sensor 10 forms a small, compact assembly that may be easily installed within a fluid container. The sensor 10 may be attached to the container by the mounting bracket 20.

Mounting bracket 20 securely receives the fluid level sensor 10 and attaches that sensor to an interior wall of the fluid container or to some other interior component, such as a fuel sender unit...The linkage component is designed to support fluid level sensor 10, and more particularly the ultrasonic transceiver 14, in a disposition that is parallel to the fluid surface (assuming the fluid surface is not at an incline) and spaced from a bottom surface or floor of the container.²

The Applicant respectfully disagrees with the Examiner's assertion that the limitations recited in claims 10-15 are mere design choices and do not provide any improvement over the prior art of record³, as improvements directed to the installation and operation of the fluid level sensor are more than a mere design choice.

In addition, dependent claims 11 and 12 call for more specific mounting bracket constructions, with claim 11 being directed to a retaining element and claim 12 being aimed at the linkage component. The cited prior art clearly fails to show a cup-shaped retaining element closed at a lower axial end and open at an upper axial end, as called for in claim 11; nor does it show a linkage component having one or more linkage arms biased in the manner defined in claim 12. For at least these additional reasons, dependent claims 11 and 12 define subject matter that is not taught, disclosed or even suggested in the cited prior art.

In view of the amendments to claim 1 and for the reasons set forth above, the Applicant respectfully traverses the rejection of claims 1-9 and 11-18 and requests

² US Application No. 10/613,164; pages 8-9

³ Office Action dated 8/11/2004; page 3

reconsideration and allowance of those claims. Claim 10 is canceled without prejudice.

Claims 19-28-

Claims 19-28 are cancelled without prejudice.

Claims 29-39-

Claim 29 is directed to a method for measuring the fuel level within a fuel tank and includes a number of steps, including those defined in steps (g) and (h). The Benghezal patent never discloses or even suggests using the method of claim 29, particularly steps (g) and (h); rather, it specifically teaches away from using such a method.

As stated in the summary of the invention it is an object of the present invention to provide a fluid level sensor capable of improved operation, "...particularly in vehicle fuel tanks experiencing *low fuel levels* or significant sloshing."⁴ (emphasis added) Delivering accurate fuel level readings across a wide range of fuel levels, including low fuel levels, and across a variety of fuel temperatures, can be challenging and has been addressed in the industry through a number of different techniques. The Benghezal patent teaches a signal processing technique, however, that technique varies substantially from the technique recited in claim 29.

First, claim 29 calls for the step of "determining whether the surface of the fuel is at a level that is at or below said reference element"; this step is not disclosed or suggested in Benghezal. That patent discloses, for example, a number of error checking methods where supervisory means determine whether an echo time is between two acceptable predetermined values (steps 1131, 1161), but that is not per se the same as determining whether the surface of the fuel is at or below the reference element, as called for in claim 29.

Second, the signal processing technique taught in Benghezal clearly fails to disclose the step of "determining a fuel level measurement based on the roundtrip echo time of said ultrasonic measurement signal *and a default ultrasonic signal velocity*" if the surface of the fuel is at or below a reference element, as called for in step (h). In fact, that patent specifically teaches away from such a step, as it instead utilizes methods such as the iterative

⁴ US Application No. 10/613,164; page 4

loop of Fig. 8 (steps 1112, 1120, 1130, 1131) and that of Fig. 9 (steps 1142, 1150, 1160, 1161) when it encounters measurements that fall outside of a predetermined range. If out-of-range measurements keep being returned, then error flags are thrown and incremented accordingly. The same generally applies for both the initialization and the stabilized measurement phases.

According to another step used in the Benghezal process, if the number of errors associated with echo times exceeds a predetermined amount, then the calculated liquid level is simply assigned a predetermined value (step 1593). This is clearly a much different approach than that used by the claimed method of the present invention.

In additional, dependent claims 30 and 31 further call for the default ultrasonic signal velocity of claim 29 to be based upon a predetermined fixed velocity value and the last calculated velocity value, respectively. There is no disclosure in Benghezal that even suggests using such steps. Thus, for at least these additional reasons, dependent claims 30 and 21 define patentable subject matter and should be allowed.

While the Applicant agrees with the Examiner that "...the method of operation of the device in Benghezal is not explicitly disclosed to be exactly like the method in the present application...", the Applicant respectfully disagrees with the assertion that the claimed method is roughly disclosed or would be obvious in view of that patent. There is simply nothing in Benghezal that suggests claimed steps (g) and (h). Accordingly, a reconsideration and allowance of claims 29-39 is respectfully requested.

Claim 40-

Claim 40 is cancelled without prejudice.

New Claims 41-44-

For reasons similar to those previously discussed in greater detail, the cited prior art does not show or suggest providing a fuel level sensor assembly as defined in the newly added claim 41, or a fluid level sensor system as defined in claims 42-44. Therefore, it is respectfully requested that these claims be allowed.

Appl. No. 10/613,164
Amd dated: November 12, 2004
Reply to Office Action of: August 11, 2004

Conclusion

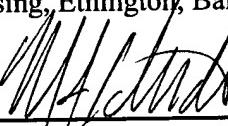
For the foregoing reasons, reconsideration and allowance of claims 1-9, 11-18, 29-39 and 41-44 is respectfully requested.

In the event that the Examiner does not agree that the claims are now in condition for allowance, his courteously invited to contact the undersigned at the number given below in order to discuss any changes proposed by the Examiner or otherwise needed to place all of the claims in a condition for allowance.

We believe no additional claim fees are due; however, in the event that any additional fees or charges are required as determined by Patent Office calculations, it is respectfully requested and hereby authorized that such fees be charged to our Deposit Account 50-0852.

Respectfully submitted,

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